General

Guideline Title

Standardizing central venous catheter care: hospital to home.

Bibliographic Source(s)

The Nebraska Medical Center. Standardizing central venous catheter care: hospital to home. Omaha (NE): The Nebraska Medical Center; 2012. 8 p. [9 references]

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

Note: Standardizing Central Catheter Care in the Omaha Region: Care from Hospital to Home (SCORCH) Consensus refers to agreed upon content based on the clinical experience and judgment of committee members in the absence of definitive or conclusive research or other evidence.

Accessing a Central Venous Access Device (CVAD)

Assessment

For peripherally inserted central venous catheters and midline catheters, verify external catheter length (i.e., exit site markings) before accessing (Infusion Nurses Society, 2011).

- Follow agency policy regarding accessing line if exit markings differ from information documented upon insertion (SCORCH Consensus).

The assessment and treatment of phlebitis, infiltration or extravasation shall be established per agency policy (Infusion Nurses Society, 2011).

Hand Hygiene

Hand hygiene should be performed before and after accessing an intravascular catheter (O'Grady et al., 2011; Infusion Nurses Society, 2011; Cope et al., 2011).

Perform hand hygiene procedures either by washing hands with conventional soap and water or with alcohol-based hand gel (O'Grady et al., 2011).

Glove use is required per standard precautions per Occupational Safety and Health Administration (SCORCH Consensus).

Scrub Time for the Access Cap

In the absence of definitive data, the Consensus Group suggests scrubbing the access cap for a time of no less than 5 seconds, using 70% alcohol solution and vigorous scrubbing (O'Grady et al., 2011; Infusion Nurses Society, 2011; SCORCH Consensus; Rupp et al., 2012).

Implanted Port Access (in addition to all of the above)

Use aseptic technique and sterile gloves when accessing an implanted port (Infusion Nurses Society, 2011).

- The registered nurse (RN) will wear a mask when accessing an implanted port (SCORCH Consensus).
- Skin preparation for accessing the implanted port to be determined by agency policy (SCORCH Consensus).

Cover the noncoring needle and access site of an implanted port with a transparent semipermeable membrane (TSM) dressing or gauze dressing (Infusion Nurses Society, 2011).

- If gauze is used to support the access needle and it does not prevent visualization of the needle insertion site under a transparent dressing, it can be considered a transparent dressing and changed every 7 days (Infusion Nurses Society, 2011).

Replace the noncoring needle at least every 7 days or if it becomes dislodged (Infusion Nurses Society, 2011; SCORCH Consensus).

Flushing (See Table: Flushing Frequencies and Use of Heparin in original guideline document.)

General Flushing

A single use syringe should never be used more than once (even on the same lumen) (SCORCH Consensus).

A 10 ml syringe filled with normal saline should not be divided into several doses and used for multiple lumens (Infusion Nurses Society, 2011).

Syringe Size

To prevent catheter damage, and unless otherwise directed by the manufacturer, the minimum syringe size that should be used to flush a CVAD and for subsequent flush (post-medication administration) is 10 ml (Infusion Nurses Society, 2011).

Volume

A minimum volume of twice the internal volume of the catheter should be used to flush the CVAD (Infusion Nurses Society, 2011).

- In general, for the adult population, 10 ml is sufficient; for the pediatric population, 1–5 ml is sufficient for the majority of catheters (SCORCH Consensus).

Technique

Flushing technique will depend upon the type of catheter and type of connector valve being used.

- For catheters with negative pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion, maintaining pressure at the end of the flush to prevent reflux back into the catheter (positive pressure technique).
    - Positive pressure is maintained while flushing a catheter by clamping the extension tubing while still flushing the line (Cope et al., 2011; Chernecky et al., 2009; Hadaway & Richardson, 2010).
- For catheters with positive pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion.
    - Disconnect syringe from injection port after flushing and then close the clamp (Chernecky et al., 2009; Hadaway & Richardson, 2010).
- For catheters with neutral pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion.
    - Clamp sequence is not required; clamping can be done before or after disconnection of syringe (Chernecky et al., 2009; Hadaway & Richardson, 2010).

Solution and Frequency for CVAD in Intermittent Use and in Maintenance Mode

0.9% NaCl (normal saline [NS]) solution should be used to flush lines before and after each use (Infusion Nurses Society, 2011).

Drawing Blood For Laboratory Testing

Pre-Draw

For pediatric patients, draw blood samples per physician order. Drawing blood samples peripherally is the preferred method (SCORCH

Consensus).

When drawing blood for therapeutic drug levels, draw blood from a lumen other than the lumen being used for the drug infusion when possible (Infusion Nurses Society, 2011).

- Refer to and follow troubleshooting steps to the extent that time permits and the patient care situation allows if the other lumen is problematic (SCORCH Consensus).

Use caution in interpreting results when therapeutic drug levels are drawn from same lumen being used to administer the medications (Infusion Nurses Society, 2011; Cope et al., 2011).

- If laboratory values appear to be grossly inaccurate, redraw a blood sample from a peripheral vein (Infusion Nurses Society, 2011; Cope et al., 2011).

If CVAD is connected to an infusion, stop all infusates for at least one minute before drawing blood sample (Cope et al., 2011).

For adult patients, flush CVAD with 10 ml NS before blood sample is drawn (Infusion Nurses Society, 2011).

For pediatric patients, flush CVAD with 3–5 ml NS or as directed by the physician before blood sample is drawn (SCORCH Consensus).

If total parenteral nutrition (TPN) is infusing in the lumen from which blood is to be drawn, flush line with 20 ml NS before blood is drawn in adults (Infusion Nurses Society, 2011; Cope et al., 2011) and 5 ml NS in pediatric patients (SCORCH Consensus).

Discard

To avoid contamination and blood clot formation, do not reinfuse the discard specimen following blood draw (Infusion Nurses Society, 2011).

Discard 1.5–2 times the volume of the internal catheter lumen (5 ml is sufficient for adult patients; 3 ml is sufficient for pediatric patients) before drawing blood sample (Cope et al., 2011).

Post-Draw

Following blood draw, flush CVAD with 20 ml NS for adults, and 3–5 ml NS or as directed by the physician for pediatric patients, using vigorous, pulsating technique (Cope et al., 2011; SCORCH Consensus).

Drawing Blood Cultures

General Information

Use of blood drawn from a CVAD is not recommended for blood cultures, unless the CVAD is suspected to be the source of infection (SCORCH Consensus).

There are two methods appropriate for drawing blood from a CVAD for blood cultures.

Pre-draw and Obtaining Specimen

A. Remove the access cap, scrub the catheter hub vigorously with a 70% alcohol pad for a minimum of 5 seconds, and replace with a new access cap. Draw the blood culture specimen from the new access cap after scrubbing the access cap for a minimum of 5 seconds with a 70% alcohol pad (Cope et al., 2011).
   OR

B. Remove the access cap, scrub the catheter hub vigorously with a 70% alcohol pad for a minimum of 5 seconds. Draw the blood culture specimen directly from the catheter hub (Cope et al., 2011).

Discard

Do not discard blood sample when obtaining specimen for blood cultures (SCORCH Consensus).

Post-Draw

Replace with new access cap when blood draw is complete (unless new cap was placed immediately before specimen was drawn) (SCORCH Consensus).

Following blood draw, flush CVAD with 20 ml NS for adults, and 3–5 ml NS or as directed by the physician for pediatric patients, using vigorous, pulsating technique (Cope et al., 2011; SCORCH Consensus).

Document the site (specifying lumen used, if multiple lumen CVAD) and the time when the blood culture specimen was drawn on the lab specimen container and/or on the specimen label (SCORCH Consensus).

Dressing Change

General Information

With a well-healed tunneled CVAD, consideration may be given to no dressing (Infusion Nurses Society, 2011; Cope et al., 2011).

Assess every CVAD within 24 hours of insertion to verify integrity and assess for post insertion complications (SCORCH Consensus).

Replace catheter site dressing if the dressing becomes damp, loosened, or visibly soiled (O'Grady et al., 2011; Infusion Nurses Society, 2011; Cope et al., 2011).

Replace catheter site dressing at least every 7 days for transparent dressings, and every 2 days for gauze dressings (O'Grady et al., 2011; Infusion Nurses Society, 2011) except in those pediatric patients in which the risk for dislodging the catheter may outweigh the benefit of changing the dressing (O'Grady et al., 2011).

When gauze is placed under a transparent dressing, it should be considered a gauze dressing and therefore changed every 2 days (Infusion Nurses Society).

- If gauze is used underneath a transparent dressing to support the noncoring needle in an implanted port and does not prevent visualization of the insertion site, it is not considered a gauze dressing (Infusion Nurses Society, 2011).

Access Cap Change

Change the access cap at least every 7 days or per manufacturer's recommendations and in the presence of any of the following:

- Access cap is removed to initiate an infusion or draw blood (SCORCH Consensus).
- Blood cannot be completely flushed from the access cap after blood draw (Infusion Nurses Society, 2011).
- Signs of blood, precipitate, cracks, leaks, or other defects are noted (Cope et al., 2011).
- Access cap septum is no longer intact (e.g., after multiple uses) (Cope et al., 2011; SCORCH Consensus).
    - If access cap change is performed with dressing change, the provider should don a mask and have the patient don a mask during the access cap change unless the patient is able to turn their head away and maintain this position throughout the procedure (SCORCH Consensus).
    - There is conflicting evidence regarding wearing a mask when accessing a CVAD catheter hub or changing an access cap (Infusion Nurses Society, 2011). If the access cap change is done at a time other than the time of a dressing change, the use of a mask should be compliant with agency policy (SCORCH Consensus).

Dressing Change Procedure

Perform hand hygiene (see hand hygiene guidelines) and don clean gloves to remove old dressing.

- After the dressing is removed, remove gloves, perform hand hygiene.
- Don a mask and have the patient don a mask unless the patient is able to turn their head away and maintain this position throughout the procedure (SCORCH Consensus).
- Change the dressing per sterile technique using sterile gloves (Infusion Nurses Society, 2011; SCORCH Consensus).

Use chlorhexidine solution for skin antisepsis as part of CVAD site care, for patients older than 2 months of age (O'Grady, et al., 2011; Infusion Nurses Society, 2011).

When cleansing the insertion or exit site, use gentle friction for 30 seconds to ensure that the disinfectant has adequate skin penetration and contact time (Cope et al., 2011).

Allow the antiseptic to air dry completely. Do not fan (SCORCH Consensus).

There is conflicting evidence regarding the use of chlorhexidine in infants aged <2 months (SCORCH Consensus).

Use of chlorhexidine in infants younger than 2 months should comply with agency policy or physician order (SCORCH Consensus).

If chlorhexidine is used with a patient younger than 2 months of age, clean the exit site for 30 seconds using gentle friction, allow to air dry completely. Wipe with sterile NS (SCORCH Consensus).

Chlorhexidine solution is preferred for skin antisepsis as part of CVAD site care. If there is a contraindication to the use of chlorhexidine, there is no directive to use one specific product over another. One should preferentially use:

- A povidone-iodine with alcohol combination solution. If this is not available:
  - Iodophor (povidone-iodine), 70% alcohol, or one percent to two percent tincture of iodine may be used (Infusion Nurses Society, 2011; Cope et al., 2011).
  - Dried povidone-iodine used with infants younger than 2 months of age or with patients with compromised skin integrity should be removed with NS wipes or sterile water (Infusion Nurses Society, 2011).

Dressing Change with Chlorhexidine-impregnated Dressings

There are no specific clinical indications or relevant studies that detail the need to change a soiled chlorhexidine-impregnated dressing before the seven-day dressing cycle ends (SCORCH Consensus).

Change the chlorhexidine-impregnated dressing if it is approximately two-thirds saturated with organic matter (SCORCH Consensus).

Troubleshooting Access Barriers

When a provider assesses for and identifies signs of CVAD occlusion, including the inability to withdraw blood, sluggish flow, and/or inability to flush or infuse through the device, the following steps should be taken:

1. Assess for potential causes of catheter occlusion;
2. Have the patient change position by lifting arm on the side of the body of the insertion site, turning from side to side, coughing, or other maneuvers to change body/CVAD position. If this does not alleviate the problem,
3. Remove the access cap and attempt to flush/withdraw blood using the direct method of connecting the 10 ml syringe to the catheter hub, and then replace with a new access cap. If it is an implanted port, consider changing the access needle. If steps in #3 do not alleviate the problem,
4. Consider changing the CVAD site dressing. If this does not alleviate the problem,
5. Consult with a physician for further orders, which may involve use of a fibrinolytic agent.
   - If a fibrinolytic agent is ordered, repeat x1 if first attempt is ineffective (for total of 2 doses). Leave second dose of the fibrinolytic agent indwelling up to 24 hours before proceeding with next steps in troubleshooting. If the fibrinolytic agent is ineffective,
6. Consult with a physician and consider next steps in troubleshooting the occluded CVAD such as obtaining an X-ray to verify line integrity and/or a cathetergram (Infusion Nurses Society, 2011; SCORCH Consensus).

Other Information

Equipment

Minimize connections (i.e., number of extension sets) in infusion administration sets (O'Grady et al., 2011; SCORCH Consensus).

Change the needleless components at least as frequently as the administration set (O'Grady et al., 2011).

A new sterile compatible covering device (i.e., a new needleless connector) should be attached using aseptic technique to the end of the administration set after each intermittent use (Infusion Nurses Society, 2011).

Primary Continuous Infusion Administration Sets

Primary administration sets used for continuous infusions that enhance microbial growth (i.e., lipids, TPN with lipids) should be changed every 24 hours after initiation of therapy (O'Grady et al, 2011; Infusion Nurses Society, 2011; Cope et al., 2011).

Primary administration sets used for continuous infusions that do not enhance microbial growth should be changed twice weekly and at least every 96 hours, unless contraindicated by medication being administered (O'Grady et al., 2011; Infusion Nurses Society, 2011; Cope et al., 2011).

- Scheduled weekdays of administration set change to be determined per agency policy (SCORCH Consensus).

Secondary Continuous Infusion Administration Sets

Primary administration sets used for intermittent infusions should be changed every 24 hours (Infusion Nurses Society, 2011).

A secondary administration set that is detached from the primary administration set is considered a primary intermittent administration set and should be changed every 24 hours (Infusion Nurses Society, 2011).

Intravenous Fat Emulsions

When administering lipids intermittently, the administration set should be changed with each new lipid container (Infusion Nurses Society, 2011).

Heparin Use

There is conflicting evidence regarding the use of heparin to maintain patency.

- Consider individualized patient needs for indications for heparin use (Infusion Nurses Society, 2011).

If heparin is to be used, the least amount of heparin needed to maintain patency is desired (SCORCH Consensus).

If heparin is being used, the preferred concentration is 10 units/ml for adults unless otherwise indicated or per physician order (Cope et al., 2011).

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Diseases or conditions that require out-of-hospital central venous access device (CVAD)

Guideline Category

Evaluation

Management

Prevention

Clinical Specialty

Cardiology

Critical Care

Geriatrics

Hematology

Infectious Diseases

Internal Medicine

Nephrology

Nursing

Oncology

Orthopedic Surgery

Pediatrics

Pharmacology

Preventive Medicine

Surgery

Intended Users

Advanced Practice Nurses

Health Care Providers

Hospitals

Nurses

Physician Assistants

Physicians

Public Health Departments

Guideline Objective(s)

To standardize the out of hospital care of patients with central venous catheters in order to optimize safe medication administration across the continuum of care and improve patient outcomes

Target Population

Pediatric and adult patients with central venous catheters

Interventions and Practices Considered

1. Accessing the central venous access device (CVAD)
    - Assessment of the CVAD
    - Hand hygiene
    - Scrub time for the access cap
    - Implant port access (aseptic technique and sterile gloves)
2. CVAD flushing
    - General flushing
    - Syringe size
    - Volume
    - Technique
    - Solution (0.9% sodium chloride) and frequency
3. Drawing blood for laboratory testing and blood cultures
    - Pre-draw
    - Discard
    - Post-draw
4. Dressing changes, including access cap changes
5. Troubleshooting of access barriers
6. Management of equipment
7. Administration of intravenous fat emulsions
8. Administration of heparin

Major Outcomes Considered

- Safety and effectiveness of central venous access device (CVAD) medication administration
- Prevention of infection and other complications of CVAD use, maintenance, and medication administration

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The guidelines did not evolve out of a comprehensive or exhaustive literature search.

Rather, the Standardizing Central Catheter Care in the Omaha Region: Care from Hospital to Home (SCORCH) Consensus Group knew the Centers for Disease Control and Prevention (CDC), Infusion Nurses Society (INS), and Oncology Nursing Society (ONS) were disseminating updated guidelines of central venous catheter (CVC)-related care (all were published in May or June 2011), including prevention of infections and other complications.

The Consensus Group examined their respective current agency policies and compared them with what best practices would indicate appropriate care should look like, based on the CDC, INS, and ONS guidelines. When the Consensus Group questioned lack of evidence in these established guidelines (e.g., using heparin or not) the Consensus Group went to the literature to examine complications such as heparin induced thrombocytopenia. Thus, the Consensus Group performed 'small' literature searches and looked at evidence to support the guidelines being developed.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Expert Consensus

Subjective Review

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Quality of individual sources of evidence was assessed using a hierarchical rating system.

A. Meta-analysis or comprehensive systematic review of multiple experimental research studies
B. Randomized, controlled study
C. Cohort study
D. Case control study
E. Descriptive or qualitative study
F. Expert opinion, textbook

Methods Used to Analyze the Evidence

Review

Description of the Methods Used to Analyze the Evidence

The Consensus Group analyzed the Centers for Disease Control and Prevention (CDC), Infusion Nurses Society (INS), and Oncology Nursing Society (ONS) guidelines, noting the rating scheme for strength of evidence in each. When evidence was lacking in these established guidelines, the Consensus Group went to the literature to examine other sources of evidence. The Consensus Group used a rating scheme for evaluating the strength of these additional sources of evidence.

Methods Used to Formulate the Recommendations

Expert Consensus (Consensus Development Conference)

Description of Methods Used to Formulate the Recommendations

The Consensus Group met in a series of 10 working sessions to discuss key points in central venous catheter (CVC) care and also examined their respective current agency policies. Recent evidence-based guidelines were compared to current practices and, where gaps were evident, literature review and expert opinion was sought.

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

References Supporting the Recommendations

Chernecky C, Macklin D, Casella L, Jarvis E. Caring for patients with cancer through nursing knowledge of IV connectors. Clin J Oncol Nurs. 2009 Dec;13(6):630-3. PubMed

Cope D, et al. Vascular access devices (VADS). In: Camp-Sorrell D, editor(s). Access device guidelines: recommendations for nursing practice and education. Pittsburgh (PA): Oncology Nursing Society; 2011.

Hadaway L, Richardson D. Needleless connectors: A primer on terminology. J Infus Nurs. 2010;33(1):22-31.

Infusion Nurses Society. Infusion nursing standards of practice. J Infus Nurs. 2011;34(1S):S1-S80.

O'Grady NP, Alexander M, Burns LA, Dellinger EP, Garland J, Heard SO, Lipsett PA, Masur H, Mermel LA, Pearson ML, Raad II, Randolph AG, Rupp ME, Saint S, Healthcare Infection Control Practices Advisory Committee (HICPAC). Guidelines for the prevention of intravascular catheter-related infections. Clin Infect Dis. 2011 May;52(9):e162-93. PubMed

Rupp ME, Yu S, Huerta T, Cavalieri RJ, Alter R, Fey PD, Van Schooneveld T, Anderson JR. Adequate disinfection of a split-septum needleless intravascular connector with a 5-second alcohol scrub. Infect Control Hosp Epidemiol. 2012 Jul;33(7):661-5. PubMed

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified for most recommendations (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Improved provision of best practices to patients dismissed from hospital with central venous catheters in place
- Optimization of safe medication administration across the continuum of care
- Improved patient outcomes

Potential Harms

- Central venous access device (CVAD) use poses a risk of infection, which these consensus guidelines seek to minimize.
- In an effort to avoid systemic anticoagulation of the patient during use of heparin flushes in pediatric patients, multiple doses of heparin over a short time period (defined here as 4 hours), that result in an average total of heparin dosage greater than 25 units/kg/hour may constitute systemic anticoagulation. All administrations of heparin must be considered when calculating total heparin dosage: heparin in running intravenous (IV) lines, and administration through all lines and lumens of central lines being flushed.

Qualifying Statements

Qualifying Statements

These guidelines are for guidance only and are not a substitute for physician or nursing judgment or consultation with experts with respect to individual patients.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report

Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Safety

Identifying Information and Availability

Bibliographic Source(s)

The Nebraska Medical Center. Standardizing central venous catheter care: hospital to home. Omaha (NE): The Nebraska Medical Center; 2012. 8 p. [9 references]

Adaptation

Portions of these guidelines have been adapted from the following evidence-based central venous access devise (CVAD) guidelines:

- Cope D, et al. Vascular access devices (VADS). In: Camp-Sorrell D, editor(s). Access device guidelines: recommendations for nursing practice and education. Pittsburgh (PA): Oncology Nursing Society; 2011.
- Infusion Nurses Society. Infusion nursing standards of practice. J Infus Nurs 2011;34(1S):S1-S80.
- O'Grady NP, Alexander M, Burns LA, Dellinger EP, Garland J, Heard SO, Lipsett PA, Masur H, Mermel LA, Pearson ML, Raad II, Randolph AG, Rupp ME, Saint S, Healthcare Infection Control Practices Advisory Committee (HICPAC). Guidelines for the prevention of intravascular catheter-related infections. Clin Infect Dis 2011 May;52(9):e162-93.

Date Released

2012

Guideline Developer(s)

The Nebraska Medical Center - Hospital/Medical Center

Source(s) of Funding

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Guideline Committee

Standardizing Central Catheter Care in the Omaha Region: Care from Hospital to Home (SCORCH) Consensus Group

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Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from The Nebraska Medical Center Web site .

Availability of Companion Documents

None available

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on December 14, 2012. The information was verified by the guideline developer on January

16, 2013. This summary was updated by ECRI Institute on March 6, 2014 following the U.S. Food and Drug Administration advisory on Over-the-Counter Topical Antiseptic Products.

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